Clues from Brain Research for Challenging Gifted Learners

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"The brain, with its complex architecture and limitless potential, is a highly plastic, constantly changing entity that is powerfully shaped by our experiences in childhood and throughout life."
—Marian Diamond, Ph.D., University of California, Berkeley (1998, p.2)

"An animal is only as smart as it needs to be...nature programs parts of the brain to sharpen up when—and only when—experience demands it."
—Richard Coss, Ph.D., University of California, Davis (Diamond, 1998, p.29)

For several decades educators have had the advantage of a growing body of data from the neurosciences. These data have provided numerous clues to how the brain develops, the impact of early experience on the brain, the relationship of intelligence and brain development, and how educators and parents might make learning and teaching more effective and efficient. Because of this body of work, the very definition of intelligence has changed for it can no longer be restricted to the linear, rational cognitive function, but must include the integration of all of the functions of the brain: the cognitive (both linear and spatial), the emotional-social, the physical, and the intuitive. Intelligence must be considered dynamic just as the growth of the functions of the brain are dynamic with high levels of in-

(see CLARK, page 12)
FROM THE PRESIDENT

Karen Fitzgerald

As another school year draws to a close, it is time to reflect on the past year with all of its glories, all of its sorrows. It is time to look back and say, “Thank you for all you do.” As an educator, I always find this time of year most exciting. Students are ready to get out of school for the summer. Teachers are anxious for the school year to be over. Parents are making plans for summer experiences. Everyone is filled with hope and anticipation of what is to come, not only during the summer, but when school opens again in August. Times like this continually remind me why I chose to be a teacher of the gifted.

Just last week I stopped by one of our elementary schools for a visit to classrooms and couldn’t resist a quick stop in the library. There, among the stacks of nonfiction books, was seven-year-old gifted student Sarah, looking for information on her plant cloning project. She asked me if I could help her find some interesting books on plants that would help with her research. Sarah’s teacher and parents were encouraging her to follow her interests in her studies. While other students in Sarah’s class didn’t understand her passion for plant cloning, those closest to her did.

As teachers and parents of the gifted, you are fortunate to see daily the curiosity and creativity of bright children. You give your students the opportunity to explore and you encourage their natural inquisitiveness. You are constantly aware of each student’s interest in a subject. You like students deciding some of the specifics they want to explore within a topic of study. You understand that student choice is important in gifted programs and you strive to motivate your students toward more depth and greater complexity in their studies. Recently John, a fourth grader, told me he likes the gifted program best because he isn’t asked to complete numerous worksheets for TAAS review there.

(see FITZGERALD, page 18)
We have no idea the havoc we wreak nor the damage we inflict upon gifted/talented students when we fail to give them the curriculum they need and deserve. Gifted students in Texas spend on average 2,275 days in school (K-12) and this time must be filled with challenges that stretch the mind and press the envelope of potential. Curriculum should set the stage for these adventures.

However, curriculum often is perceived as dry, boring, and most frequently as volumes used for doorstops or bookends. Curriculum should be a map and guide for the journey to excellence as well as a compact with the people. Is the map flat, round, or multidimensional? Does such a compact exist? What is curriculum? How does it impact gifted students?

Definitions and Expectations
Curriculum is defined in many ways, and all or most definitions are valid at least from the perspective of the user. According to F. English (1992), there is the written, taught, and tested curriculum. Written curriculum can be state-mandated, district or campus designed, and teacher prepared. Taught curriculum is the product actually delivered in the classroom or other learning environment. Tested curriculum includes the content and processes that are assessed. Ideally, there is direct alignment of these curricula. In reality, this alignment is difficult to achieve.

There also are parent, community, higher education, and student curricula. Parents, usually based on their own schooling experiences, have expectations of what their child or children should learn in school. The community has numerous curricular expectations of the schools. Whether it is basic skills preparation, work force development, penmanship, citizenship, computer literacy, health education, physical education, athletic competitions, fine arts, academic competitions, safety, responsibility, self-discipline, oral communication skills, (not to mention) reading, writing, mathematics, science, geography, or history, the range of community curricular expectations grows almost continuously. Higher education administrators and faculty members have collective and individual curricular expectations of public and private K-12 schools. These expectations vary campus-to-campus and college-to-college depending upon university or school culture, education goals, and societal pressures.

Most importantly, however, are the individual anticipations that the child brings to the classroom. Each stu-
Teaching Beyond the Average: A Vision for Classroom Change

Robert Arthur Schultz
Margaret Ann Price

Curriculum is a word with many, many definitions. Depending on the focus, curriculum can be defined as simply as the textbook, or as complex as the meaning of life. In this article, curriculum is broadly examined, not as something to be implemented in a classroom, but as an integral part of everything that has to do with teaching and learning.

The word curriculum dates back to ancient Greece. In its most literal translation, currere (curriculum) is a “course to run,” the “what,” if you will, of teaching. However, this literal definition is too limiting.

Curriculum involves more than the materials and experiences provided by the teacher for the student. Interactions occur between students, the educational setting, teachers, the environment, and community that influences classroom actions (Schultz & Delisle, 1997). “A curriculum includes some notions of where the traveler is going, how the traveler might get there, and what life might be like not only on arrival, but also along the way” (Marsh & Willis, 1995, p. 9).

Curriculum is more than the “what” of teaching. It also involves how we plan to implement activities and why we choose a particular method or activity in the first place. Metaphorically, curriculum is a complex entity that fluidly evolves as the interplay of the aforementioned components act upon one another. This continually changing milieu effects a teacher’s best developed instructional plans in a multitude of ways. Often these complex interactions and effects are not considered during teacher certification programs.

Teacher Training

Teacher preparation tends to focus on general pedagogical concerns such as classroom management, preparing lesson plans, and assessment and evaluation. Rare are the programs that focus on purposeful instructional design based on the needs and interests of the students. This is understandable in that few programs involve intensive field experience by preservice teachers where they interact with the classroom milieu throughout a school year.

Preservice teachers do not have many opportunities to get to know students in their field site placements as they shuffle in and out on a rotating basis. This does little to provide a sense for the rhythms and cycles that guide classroom operations, interactions, and negotiations (Connelly & Clandinin, 1988).

Since 1987, Texas, for example, has pared down programs of teacher development in colleges and universi-
The Texas Higher Education Coordinating Board (THECB) has capped the number of pre-professional hours required for the certification process. Particularly in secondary education, preservice teachers are limited to 18-hours of college course work carrying the "education" moniker (THECB, 2000).

Teacher educators face a particular dilemma in the curriculum coverage of their classes. While there may be cursory coverage (if any at all) focusing on exceptional students in the general curriculum, there is little time to focus on the particular strategies, nature, and specific needs of these students. Courses specifically designed to explore giftedness are often relegated to masters degree programs, which relatively few Texas teachers pursue. Consequently, teachers entering the classroom have a myopic view of how to work with exceptional populations based on their preconceived notions about these individuals.

In typical certification programs for teachers of the gifted and talented, instructional design and classroom experiences are critical to understand giftedness in its many forms. An assumption often underlying the preparation program is that teachers who return to a college or university for certification after earning an initial teaching credential have expertise regarding curriculum development, instructional planning and implementation based on student needs. However, this is rarely the case when these teachers have had minimal, if any, opportunities to reflect on their practices through interaction with other teachers or to explore pedagogical options. "Most teachers limits the ability of the candidate to implement perceived best practices when they differ from the philosophical orientation the teacher holds regarding style of teaching and expectations for student learning. Perceived notions and beliefs are difficult to alter, not only with students!"

I teach a battery of education courses for secondary preservice teachers including Issues and Reform in Education, Instructional Design, Classroom Leadership, and Curriculum Development. Since our secondary certification program requires a content degree, most of the individuals I work with consider themselves content experts. Many view teacher education courses as barriers to their aspirations, and wastes of time and money. Indeed, few of the almost 200 individuals I have worked with believe students have special needs or abilities requiring teacher modification and classroom accommodation. As a teacher of the gifted, this perception frightens me!

Acceptance, respect, and responsibility are focal points in every course I teach — keys to knowing and understanding one's students. I challenge the notion that most students are "typical" and the expectation that having knowledge of a laundry list of teaching strategies ensures student learning. I voice my concern that learning is rarely a result of teaching; knowing that this is exactly the scenario playing out in my courses (a concern I readily share with preservice teachers.) They empathize and assure me that this is not the case. Nevertheless, I know their perceptions and expectations have been reinforced by years of experience as students; and will likely reemerge once my class becomes a distant memory (Schultz, 1999, p. 4)

It is apparent that curriculum must be designed and implemented in a fluid manner at the point of contact between teacher and student. However, many gifted and talented certification programs provide only a transparent attempt to approach practical considerations of classroom implementation and instructional planning.

The most often used method is a practicum experience... (see SCHULTZ & PRICE, page 18)
Science, Service, and the Gifted Learner: Connecting Curriculum to the Real World

Mary Nied Phillips

The role of authentic learning and assessment in developing the gifts and talents of students is not a new concept. In speaking to the First General Session at the 1999 TAGT conference, Joseph S. Renzulli, long an advocate of creative productivity in young people, stressed the student's role as a first hand inquirer and producer who constructs knowledge for his present use, and finds, focuses, and acts on problems. As Renzulli paraphrased: "By their deeds ye shall know them."

Embedded in Renzulli's Multiple Menu Model presented to the TAGT audience as Figure 4 of his handout is a key factor vital to any special enrichment program for the gifted: leadership. Susan K. Johnsen (1999) writes:

"...the majority of (Texas) schools have occupied themselves with meeting 'acceptable' standards (for implementing the Texas State Plan for the Education of Gifted/Talented Students) by establishing programs in the four core academic areas. However, to achieve 'exemplary' status, a district will need to implement a 'leadership' program."

Fortunately, the need for developing the leadership potential of gifted students can be met by districts implementing Renzulli's paradigm on the development of creative productivity (1999, Figure 4, p. 2) through a service learning model. The model can be interdisciplinary, covering all five domains (arts, sciences, humanities, mathematics, and social sciences) listed by Renzulli, or it can focus specifically on one domain such as the sciences.

The emphasis throughout the National Science Education Standards (1996) is on student inquiry into authentic questions, and its chapter on Principles and Definitions clearly states that "Learning science is something students do, not something that is done to them" (p. 20). At the critical core of the Standards is the nurturing of a community of science learners participating in a wide variety of hands-on and minds-on activities ranging from observation and description to the testing of constructed explanations and the communication of their ideas and results to others.

The acquisition of scientific knowledge is combined with reasoning, thinking, and communication skills (Standards, p. 2) and based whenever possible on real life situations, whether in the classroom, outdoors, or a labora-
The Service Learning Model is therefore ideally formulated for the application of Science as Inquiry. Teaching Standards A (Standards, p. 30).

The Effective-Learning Cycle, the heart of the Service Learning Model, is summarized in *Learning Through Service* (McPherson, 1989) and refers to the four elements required for complete learning: 1) concrete experience and observation; 2) considered reflection on that experience, 3) synthesis and abstract conceptualization, and 4) testing of the new concepts in new situations (p. 4). On its Texas web site (2000), service-learning has been defined as

"a teaching methodology that enriches instruction by providing thoughtfully designed opportunities for students to use their skills and knowledge in service to and with the community."

According to McPherson (1989), one of the key components for service learning success is that students, particularly adolescents, be able to interact with adults as colleagues, rather than as those being taught. Renzulli reemphasizes this point, referring to the role of the student in an authentic learning situation as being “...transformed from one of lesson-learner to firsthand inquirer, and the role of the teacher changes from an instructor and disseminator of knowledge to a combination of coach, resource procurer, mentor, and sometimes, a partner or colleague” (1999, p. 6).

These roles for student and teacher can usually be realized in curriculum projects linking science as inquiry and service learning, particularly in the area of environmental education, where the first element of the learning cycle, making concrete experiences and observations, easily lends itself to campus or community problem identification (e.g., a littered playground or a polluted water source), even by elementary students.

A recent national survey of K-12 teachers sponsored by the Environmental Literacy Council in partnership with the North American Association for Environmental Education and the National Environmental Education and Training Foundation and conducted by the University of Maryland’s Survey Research Center, found that sixty-two percent of teachers include environmental topics in their curriculum, with recycling topping the list, followed by endangered species and energy conservation as topics most frequently covered (NSTA Reports, 1999). This strengthens the possibility for using environmentally based opportunities for authentic, service-based learning.

The service experience, based on action research by students, can be viewed as a six-step cyclical process that begins with 1) group or individual planning, and continues with 2) the implementation of the plan (experience); 3) observation or the examination of what actually happened; 4) meaning or discussion of what was learned; 5) application; and 6) the reaching of a new understanding and the planning of new activities (McPherson, 1989). Students, schools, and communities are all part of the service cycle, each benefiting through the completion of its essential components: preparation, service, reflection/evaluation, and celebration/recognition.

In Texas the school-based program that funds and coordinates service learning statewide is called the Texas PK-12 Learn and Serve America. This program receives funding from the Corporation for National Service through a contract with the Texas Education Agency which administers it through the Region 14 Education Service Center and the Texas Center for Service-Learning at the Charles A. Dana Center at the University of Texas in Austin. Education Service Centers across the state are involved in training teachers and school personnel in the service-learning methodology prior to the submission of a grant proposal; they also monitor the yearly grants.

(see PHILLIPS, page 20)
Future Problem Solving (FPS) provides students many of the skills needed to face the future creatively and with confidence. The program offers students the opportunity to understand the value of research, group interaction, problem solving, teamwork and effective communication. In addition, thinking futuristically is an important part of competing in the FPS program. Thinking futuristically, related to FPS, is difficult to teach in the classroom without techniques and tools that apply specifically to the FPS program. Teaching these techniques to middle school and high school students will help them compete in FPS and life.

Value of the Future Problem Solving Program
In 1974, Dr. E. Paul Torrance (Crabbe, 1991) started the FPS program to stimulate students to think about the future before leaving high school and teach them to creatively address important global problems. The mission of the program is to teach students creative problem solving through competitive or non-competitive instructional programs with an orientation to developing positive futures. The program incorporates many critical learning activities including topic research, student teamwork, a six-step problem solving process, and a competitive problem-solving environment. In addition to these skills, students learn the realities of teamwork, task and time management, communications skills, and the value of group contributions. This learning provides a foundation that enables students to become better thinkers concerning the challenges they will face in the future and stimulates them to become change agents. Joseph Coates (1998), a renowned futurist, states in his article “Readying Children for the Future,” that educational programs must prepare students for the future. This preparation includes helping them understand themselves, their world, their choices and plausible ways to achieve their goals. This understanding develops a sense of optimism and confidence in their ability to engage the future. Coates believes it is best to teach these skills to students between kindergarten and high school.

Future Studies and Future Problem Solving
FPS incorporates three skill categories, thinking skills, problem solving skills and communications skills. These skill categories incorporate individual knowledge development, pattern recognition, research techniques, creative
brainstorming tools, evaluating alternatives, speaking and writing skills, and ways to improve persuasion and clarity. The FPS program provides numerous tools and prescriptive problem-solving concepts for students to use in the program. Experience from year to year enhances the ability of students to use these tools and techniques.

One additional valuable skill used in FPS, but not well understood, is thinking futuristically. This thinking skill enhances the individual's ability to solve future oriented problems. While most individuals use the concepts of future thinking, it is difficult for teachers to provide specific techniques for students to use in the FPS competition. By providing teachers with tools developed in Studies of the Future programs, formatted to FPS, the teachers are able to help students understand and use the tools in FPS competition. These techniques improve the students' ability to compete in the FPS program.

How to Think about the Future
Studying the future is a problem-solving process that evaluates the past, considers today's environment, and develops alternatives that may occur in the future. In future studies, the student imagines differences from today's world, considers ideal future situations, evaluates alternative future environments, plans for achieving preferred futures, and monitors the environment for changes that may alter the course of a desired future. Thinking futuristically utilizes a number of specific techniques to help individuals think about the future. In general, people think about the future in one of three ways. Some do not consider the factors that influence their environment and only react to changes as they occur. Some individuals look at probable trends and take actions that influence the ability to study the future. Each of these limitations inhibits the ability to consider viable options the future may present. To overcome these limitations, it is important to understand what factors influence change in the environment being evaluated. There are three mechanisms of change: cycles, trends and wildcards that influence future environments. Cycles are event patterns that repeat with some degree of regularity. These can include extremely long cycles such as weather patterns, or short cycles such as sports seasons or birthdays. Trends are increasing or decreasing event patterns that do not repeat. These include patterns such as global warming, population growth, and declining job security. Wildcards are sudden or unexpected events that have a significant effect on the environment. Previous wildcards include the OPEC oil embargo, and fall of the Berlin Wall.

Understanding the change mechanisms that influence the environment being evaluated is the first step to effective futuristic thinking. The next step is to recognize that all factors work together as part of a system to influence the environment being evaluated. An example of this is population growth. There are many factors influencing both birth rate and death rate of a society. These factors include education, nutrition, medical technology, and other societal activities. All of these factors influence the overall population growth or decline of the society being evaluated. To evaluate mechanisms of change and systems, it is important to consider the factor of time. The past is the foundation for the future because it provides a basis for evaluating the cycles and trends influencing the future environment. The present, while only a moment of time, provides a step to the future by indicating the present status of the change mechanisms. In addition, the present provides a view of how the various components of the overall system interact. This information provides a foundation to develop possible options about the future.

(see HUTTON, page 22)
"The age of illustration is upon us and illustrate we must if we hope to gain and hold the attention of young and old." When I saw this quote in an advertisement, I was surprised at its succinct message. Illustration does more than grab attention; it summarizes the intensity of moments and condenses communication. The timing of the quote was startling too, because when I first saw it I was standing in an antique shop reading an 1893 ad for an apparatus called the “Stereoscope” which I later learned was a precursor to the overhead projector.

The internet already holds the attention of young and old. Knowledge on the web is increasing faster than red ants to a discarded piece of picnic cake. In 1997, there were approximately 1.2 million websites (BBN Timeline, 2000). On Friday, January 21st, 2000 headlines screamed that the Super Highway contained one billion websites (BBC News, 2000). If Moore’s Law is correct, by Independence Day, these numbers will double.

Futurist and educator David Thornburg says, “We are drowning in information… what we need now, more than ever, is the skill to know how to apply this information in useful ways, which requires knowing how to foster creativity in ourselves and in others” (Thornburg, 2000, 1).

A curriculum-based paradigm shift awaits. Curriculum enhancement and the gifted curriculum are a complementary pairing. The Internet mirrors the thinking processes of G/T teachers and students because:

- It clusters ideas
- It connects seemingly unrelated topics
- It can be disorganized

Clusters Ideas: From frenetic connections, over 500 search engines index web content by author’s name, ideas, titles, and keywords. Literally billions of resources respond to the click of a keystroke. How long can one surf the Net? Until the “12th of never” as the song suggests, or at least until the connection times out.

Connects Unrelated Topics: Enter “Lions” into the Northern Light search engine http://www.northernlight.com and the vistas of tundra and Astroturf converge in a list of references that invite investigation. The message that the world is connected and interrelated resonates in millions of transactions everyday. Gone are the eras of isolation. The Internet is a virtual Filofax for global collaboration. The implications for a Cyber United Nations
of gifted learners are exciting.

Disorganized: Visit most websites today and an instant confrontation with color, data, spinning images, blinking messages, and repeating jingles often obliterates the initial quest for inquiry. It is as if Blaise Pascal, the inventor of the computer language that bears his name saw into the future when he said, “All man’s problems stem from his inability to sit quietly in a room alone” (Caarlson, 173). If we believe that technology only mirrors society, then we are living in the midst of a global cyber collage. The teacher’s role as Cyber Travel Guide is essential to Web Resource Management.

Does the Cyber Collage Bother Students? They hardly seem to notice. The Internet comprises only one part of the technology that they choose. This is the generation that grew up connected to cable TV and hundreds of entertainment channels. Most kids today have never seen a rotary dial telephone. They recognize the name “Kennedy” first as an MTV veejay, not the 35th president. They have no problem with the metaphorical dissonance inherent in “chat rooms” without voices or webpage “visits” without travel.

How Will the Internet Influence Curriculum? The short answer is, it already has. Last year 293 million letters were sent using the US Mail. However over 2.2 billion pieces of email were also sent (Sklaroff, 1999) Of the 74 million Internet users, 80% are under age 50 (Pew Research, 1998). Within that age range, teenagers are the fastest growing “dot-com” group. There is no conversational coma in existence on the Internet with “buddy lists” and instant messaging chatroom software enabling instantaneous communication. Today, a sure sign of a dating breakup is not the return of the letter jacket or class ring, but the removal of the beloved from the buddy list.

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Table 1

Email has revived long dormant writing enthusiasm and fluency. What passes for “writing” may be a pastiche of smileys © and initial shorthand in a sentence-structureless wasteland. The teacher’s mission is to interject style and grammar.

Students and teachers learn best with technology rather than from it. But teachers usually teach as they were taught (Sargent, 1999). Teachers willing to reach kids through their medium must find and hit the elusive “any key.” Years of teaching experience makes almost (see TEAGUE, page 15)
intelligence actualized only when appropriate challenge is provided. The static, genetically inherited, immutable view of intelligence can no longer be justified. These new data have found their way into many homes and classrooms and have provided the basis for numerous books and presentations. Those involved in gifted education would benefit from the recognition of the importance of these data and the impact they can have on theories and practices.

Understanding the implications from brain research allows a clearer understanding of giftedness and its development. Children are not born gifted, but with a limitless potential based on the existence of over a hundred billion brain cells. In most infants these are healthy neurons with their endowment of unique genetic patterns awaiting the interaction with experiences that can develop them into a basis for high level abilities and gifts. At birth, these neurons are already enhanced or inhibited in their growth by both physical and emotional interactions provided in-utero. Educators at home and at school create giftedness, not just through genetics, but through experiences that are rich and appropriately stimulating.

Ample evidence now informs parents and educators that actions, sensations, and memories are constantly shaping both the function and the anatomy of the brain. The challenge now becomes to provide experiences that can optimize learning and maximize each child’s potential. An understanding of the clues brain research provides that allows optimal learning is important to the growth of all children and, because of their unique needs, critical to the development of gifted children. Several basic concepts, repeatedly confirmed by research, are essential to this understanding:

- The dynamic nature of the brain allows the growth of brain function to progress or regress, but not to remain static;
- The major function of the brain is associative, always integrating, combining, and synthesizing various modalities and areas of specialization; and
- The potential of brain development is essentially unlimited for most individuals.

Although these concepts are exciting in the possibilities they offer for nurturing all learners, the demanding need to develop unique and appropriately stimulating experiences to nurture giftedness make these clues of special interest to educators of gifted learners.

The Dynamic Nature of the Brain

The dynamic nature of brain development, the principle of progression or regression, begins at conception and ends only with the final breath. Brain structure and function change throughout life with the nature of the change dependent on the interaction between the genetic endowment and the amount and type of stimulation provided by the environment. To take advantage of this characteristic of brain function, learning must be relevant and challenging to the individual. That implies that to optimize learning we must plan curriculum to meet each child at the point at which that child is developing and then allow continuing development to occur at the child’s pace and within the child’s interests.

Clue #1

One of the differences found to be a characteristic of the brains of those with high levels of intelligence is an increased branching of the neural dendrites (the appendage of the cell that carries energy/information to the cell) within the brain resulting in more complex processing of information.

The Challenge: For gifted learners the concept of the dynamic nature of the brain requires that the materials and experiences be more complex in content, context, and presentation. To provide for complexity in the curriculum allow gifted students to:

- access a large variety of ideas at many levels;
- learn from a variety of perspectives including the view of experts and the influence of time;
- move from the known to the unknown; and
- plan and implement solutions to community problems.

Clue #2

Appropriate stimulation causes the nucleus of the neural cell to produce more powerful biochemical content within the cell body creating more efficient and effective brain processing and allowing more intensity, depth of understanding, and uniqueness of expression for the learner.
The Challenge: Changes within the cell that allow more depth of understanding require curriculum that provides more depth in the study of concepts and information by allowing the gifted students to:

- question and examine generalizations;
- access the terms and language of a variety of disciplines;
- focus on details and patterns of themes and ideas;
- embellish and elaborate on themes and ideas;
- develop skills in research, hypothesizing, and hypothesis testing.

Such changes also require that learning experiences provide more novelty by allowing students to:

- work in a climate of respect for unique and unusual ideas and products;
- develop projects of their own choosing;
- have unstructured time to physically and mentally explore, examine, and/or alter existing patterns;
- follow divergent paths, pursue strong interests, and solve problems in diverse ways;
- develop original applications of knowledge and understandings, including hypothesizing and hypothesis testing.

Clue #3
Appropriate stimulation increases the production of glial cells that surround the neural cells of the brain and whose function it is to nurture the cell body and provide an insulation sheath (mylination) to the axon of the cell. This increase in the mylination of the axon allows energy/information from the cell to be carried to other cells more quickly through a more powerful synaptic exchange. By increasing the speed of this synaptic exchange from one cell to another the speed of thought and learning is also increased.

The Challenge: As the speed of learning increases gifted students often require acceleration in their instruction and advanced and sophisticated materials from which to learn. The pace of instruction can be accelerated by: early entrance to any level of schooling such as kindergarten or college; pre-testing a lesson or unit and giving instruction on only what has not been learned; self-paced programs of instruction; or other means of tailoring the pace of learning to the student. However the acceleration of the curriculum is accomplished, the result will be moving through the core curriculum in less time than is typical. Acceleration can be provided by allowing gifted students to:

- learn and work with intellectual peers, including adults and other students with expertise in the student's interest areas;
- compact or telescope content to avoid relearning material already mastered;
- group flexibly;
- access advanced and/or unusual subject matter, materials, and processes, and new and challenging information;
- use learning centers and individual learning packets to individualize learning.

Clue #4
Through appropriate stimulation the brain can be seen to become more effective and efficient in its functioning. A more rapid integration of all of the brain's functions is one of the processes that supports this effectiveness.

The Challenge: The use the brain makes of integration as a tool of effective function requires that the curriculum give access to integration of content and processes to make optimal learning possible. To provide for integration the gifted student must be allowed to:

- work in a climate where choice is provided and encouraged;
- have access to a wide range of materials from many disciplines and eras;
- become acquainted with a large variety of ideas at many levels;
- learn integratively with all intellectual processes included in the instruction;
• incorporate visual and verbal modes in learning and evaluation;
• produce materials for evaluation that show the integration of ideas, materials, and processes across disciplines, time, and grade levels.

The Concept of the Brain's Unlimited Potential
The concept of unlimited potential calls into question many of the present assumptions about organizing educational programs and learning experiences. Neither the speed with which a child can learn nor the level at which the learning should be presented can be assumed by knowledge of the child's age. Gifted learners are often 2 to 4 years beyond the concepts and informational base provided to their age peers. This accelerated processing and the resulting advanced knowledge base are caused by changes in the brain. These are common characteristics of gifted learners and these characteristics along with the dynamic nature of the brain make it essential that the curriculum for gifted learners be differentiated. Faster pacing and the opportunity for more advanced material is of basic concern less the gifted learner regress from lack of challenge.

The provision of a curriculum that is determined only by age without consideration of what the child knows and the skills that the child has already mastered will often result in gifted children being asked to relearn what has already been mastered, tutor other children on skills and concepts already known, or do more of the same type or level of academic tasks. These are the most commonly used strategies in regular classrooms to provide for gifted learners. Such strategies will not provide the challenge the brain needs to progress to higher levels of the learner's potential. Continuous progress, not regress, must be the concern of all who work with gifted children.

The clues form the brain research mentioned above are only some of the valuable information that is now available from the neurosciences to educators and parents of gifted children. If we are to appropriately challenge those children in our care and allow them to optimize their potential we must take advantage of the new data and stretch our understanding. What is optimal can only be glimpsed, but as educators we have clues to amazing possibilities ahead.

References

Dr. Barbara Clark is a Professor in the Division of Special Education at California State University, Los Angeles. Dr. Clark is the author of the widely used text, Growing Up Gifted, now in its fifth edition, published by Charles E. Merrill (an imprint of Prentice Hall) in 1979, 1983, 1988, 1992, and 1997 and Optimizing Learning published by the same company in 1986. Dr. Clark has chapters in several books including "Early Development of Cognitive Abilities and Giftedness," in J. Whitmore (Ed.) Intellectual Giftedness in Young Children: Recognition and Development and "Educating Gifted Students in a Multicultural Society," in J. Banks (Ed.) Multicultural Education. In addition, she has published many articles in a variety of professional journals and serves as a review editor for The Gifted Child Quarterly, The Journal of Gifted Education, and as Consulting Editor for Gifted and Talented International. She is a member of the Editorial Board of IDEACCIO'N Magazine of the Centro Huerta del Rey, Valladolid, Spain.

Dr. Clark received her BA degree in Education from Wichita State University in 1955; her MA degree in Special Education, Option Learning Handicapped, from the University of California, Los Angeles, in 1966; and her EdD degree in Special Education, Option Gifted Education, from the University of California, Los Angeles, in 1969. She has taught pre-school children on television as the teacher of the commercial television program Romper Room and both regular and gifted classes at the elementary level in public schools.
Dr. Clark serves as the President of the World Council for Gifted and Talented Children, is a Past President of the National Association for Gifted Children, and is on the Board of Directors and a Past President of the California Association for the Gifted. She has been named as an Honorary Advisor for the Hong Kong Association for Parents of Gifted Children and to the Advisory Boards of the Gifted Children’s Association, Los Angeles, the Professional Advocates for Gifted Education, Wichita State University, Wichita, Kansas, and the Mirman School, Los Angeles, CA. She was named California State University, Los Angeles Outstanding Professor of 1978-1979 and nominated for California State Universities and Colleges Trustees Award for Statewide Outstanding Professor in 1980-1981 and 1984-1985.

Dr. Clark is a recognized scholar in the national, and international communities and has presented major addresses and workshops throughout the United States, and in Australia, Austria, Canada, Mexico, South Africa, the Netherlands, Taiwan, Kyrgyzstan, China, Turkey, Hong Kong, and Thailand. Her current interest is improving gifted education and talent development, and in the development of a model for optimizing learning for all children that is based on brain/mind research.

How can teachers become cyber instructors—quickly and easily, but with enthusiastic caution? The vast resources of the Internet can make Trefinger’s nomenclature of the “AHA” moment commonplace. The best way to “Get to AHA” is to add resources as an enhancement to current curriculum. One teacher said, “As you work into using the computer in the classroom, you start questioning everything you have done in the past, and wonder how you can adapt it” (Sandholtz, 17).

The progression of change moves toward a student-centered, constructivist collaboration. Passive education as receivership is an anachronism. Most teachers start by adding a website or two to enhance favorite units or lesson plans (Sargent, 1999). Table 1 displays the Internet variations of traditional lesson components.

Add “PEP” to enhance current curriculum with the Internet:

- personalize
- energize
- publicize

**Personalize**

Take an existing lesson such as an introductory unit and personalize it by adding an online puzzle. At the Puzzlemaker site [http://puzzlemaker.school.discovery.com/](http://puzzlemaker.school.discovery.com/), over 10 different puzzle templates are available. In a quick, fill-in-the-blank format, teachers can type a selection of student names or vocabulary words, even numbers, and the Puzzlemaker site creates a puzzle to print or save. Use Puzzlemaker to create puzzles that relate to the unique attributes of students, school culture, city, and beyond.

A WebQuest, an online version of the Scavenger Hunt, is another successful integration tool to build discovery learning. Professor Bernie Dodge from San Diego State University developed this problem-solving model which divides simulation problems into 6 parts: Introduction, Task, Process, Conclusion, Evaluation, and References. Following the Creative Problem Solving(CPS) model, students discover answers to a “Big Question” scenario usually while portraying roles such as TimeKeeper, Reporter, Historian, Accountant, etc. Several examples of excellent WebQuests and a template to download may be found at the following website: [http://edweb.sdsu.edu/webquest/webquest.html](http://edweb.sdsu.edu/webquest/webquest.html)

Students can visit these sites and add entries to a hardcopy or online journal, also known as E-Journal. In a cyber-based version of the coffee klatch, students may email each other or the instructor discussing the latest daily insight.

One especially helpful tool is Eboard http://www.eboard.com. Eboard is a free tool that hosts educators’ data in electronic bulletin boards. This data is ready for access at any time from any location. In ten minutes, an educator can create an Eboard by simply typing information in an online form. Updating an Eboard takes five minutes. Teachers can offer students an incentive to visit by listing a bonus question, quiz answer, or question hint. Educators may also archive previous assignments and leave assignments for absent students. Daily or weekly schedules, homework assignments, extra credit, and teaching philosophy are excellent uses for the Eboard site, or a personal webpage, or a School Intranet site.

Excitement grows as students realize the growing presence the Internet is taking within their curriculum. The “with-it-ness” factor described by Jacob Kounin permeates a personalized, energized curriculum (Ryan & Cooper, 1998, 174).

Publicize
Tout the great things you are doing in your classroom with Internet resources that can be accessed anywhere at anytime. Parents who can access assignments, vocabulary words, and handouts from work or home become connected team players.

The gifted student is often a chronic “busy bee,” pursuing a schedule that would make coffee nervous: team sports, choir, and band, church youth groups, etc. By utilizing the tools already located in the Internet, these students may be absent from school but they do not have to be absent from the curriculum.

“SchoolNotes” http://www.schoolnotes.com allows a teacher to publish online Flashcards just by typing a word and definition in an online form. Schoolnotes also offer students the option of sending email to their teacher even if the student does not have an email account. To ensure safety all students submissions are filtered and logged before being sent to the teacher.

Kierkegaard’s words echo prophetically:

"Instruction begins when you, the teacher, learn from the learner, put yourself in his place so that you may understand what is learning and the way he understands it." (Ryan and Cooper, 1998, 315)

Take a general survey of your students to see who already has webpages. You may be surprised at the online presence already represented. Invite students to help you begin or enhance your own webpage. Gifted kids enjoy sharing what they know. A wonderful collegial atmosphere replaces the traditional “Sage on the Stage” paradigm, which is the antithesis of the way gifted kids learn.

As we look ahead to curriculum innovations and issues, the single greatest achievement that the Internet may provide may be toward a sharing of knowledge rather than merely dispensing it. Perhaps the classroom can host information from the huge database of the Internet and synthesize it into something new and exciting.

Pause from your reading and remember the major events of our last century. Does your mind recall words and phrases first or pictures? The advertisement in 1893 was correct. Images convey knowledge and power. We have known this awhile. Words can frame the impact of an image. The Internet-enhanced curriculum can contain it all.

Gifted students, with their inherent sense of discovery and curiosity will continue investigate the Information SuperHighway. Teachers are invaluable as guides for students to distill, apply, create, and evaluate the cyber jungle of images and sounds in a team approach that may bring about innovation and solidarity.

As Harry Wong states, “The art of teaching is the art of assisting discovery.” (Wong, 1998) Let us begin today.

References


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**Gifted Dot.Com**

**Internet Resources**

Helen Teague

**Giftedness Self-Test** http://rocamora.org/Page45.html
Gifted educators have long been able quickly recognize the elements of giftedness in their students. Now the internet can make identification process easier. The Rocamora website at has a Giftedness Self-Test that can be printed or saved for future use. These resources might used at the first of the school to help students learn to describe their giftedness.
Grade Level: K-12 & Adult

**SprocketWorks** [http://www.sprocketworks.com/](http://www.sprocketworks.com/)
An interactive place for kids (and adults) to learn the way that they choose to learn.” This site uses shockwave files to guide your students through the night sky, play logic games, and having fun while learning. Of course you may also have fun working through the various activities as you preview the site. Subject areas are music, economics, science, art, and geography. This is one of those interdisciplinary websites where you can’t help but learn something.
Grade Level: K-12 Adult

**Trackstar** [http://scrtec.org](http://scrtec.org) is a free service from Texas A&M that helps teachers organize and list websites in an online database. Teachers do not need to know the HTML coding language; online forms hold the data. Lists of URL's frame actual websites. Add questions to each listing for added impact. Students browse through the URL’s and “stay on track” of the information they need to know.
View Bert Leclere’s track on Gifted Resources @ [http://scrtec.org/track/tracks/s05021.html](http://scrtec.org/track/tracks/s05021.html) then create your own!
Grade Level: K-12 Adult

**Webography**

Dot-Com Gifted Learners
Puzzlemaker: [http://puzzlemaker.school.discovery.com](http://puzzlemaker.school.discovery.com)
Cool Word of the Day: [http://www.cool-word.com](http://www.cool-word.com)
Quote of the Day: [http://www.bemorecreative.com](http://www.bemorecreative.com)
Historical Calendars: [http://www.historychannel.com](http://www.historychannel.com)
Eboard: [http://www.eboard.com](http://www.eboard.com)
SchoolNotes: [http://www.schoolnotes.com/](http://www.schoolnotes.com/)
WebQuests: [http://edweb.sdsu.edu/webquest/webquest.html](http://edweb.sdsu.edu/webquest/webquest.html)
One of the most important things you do as educators and parents of the gifted is to support students who take healthful chances and let them know it is all right to fail as well as to succeed. You strive to provide your students the opportunity to understand the consequences as well as the benefits of being risk-takers. "Thinking outside of the box" isn't just permitted in gifted classes, teachers of the gifted encourage it!

Educators of the gifted know that you need to give every student a voice in the classroom. You let your students know that they matter and that they are responsible for their own decisions. If your students are to be independent thinkers, then you know we must first trust them enough to give them a voice in their learning. When sixth grader Maria has more note cards on her debate topic than time to present her points, you understand and guide her step-by-step through the debate process with patience and respect.

Teachers of the gifted know how to provide the fun and excitement necessary in the gifted classroom by preparing interesting and enjoyable learning experiences. You know that it is okay to have fun while learning, especially when the topic of study is a favorite for most everyone.

Gifted students may seem self-confident, yet you continually encourage your students to believe in themselves. You tell them often that they can be very successful and that they can make a difference in the world. A part of our training in gifted classrooms includes helping gifted students to be comfortable with their gifts and talents and to be assured in their personal, academic, and emotional growth. You have learned that students who are valued, respected, encouraged, and celebrated develop strong self-worth and self-confidence.

It's an honor, as well as a huge commitment for anyone who serves as a teacher or parent of the gifted. Your strong commitment, hard work, and holding on to big dreams has paid off. As you look back, pause to reflect on all you did to foster growth in gifted students this academic year. Remember the early mornings, the late afternoons, and the lengthy nights when you gave up your family time and spent it doing school work. And, to you who spend your lives making a difference in the lives of others, we thank you. TAGT wouldn't be the strong advocacy group it is without you. Gifted programs in Texas wouldn't continue to grow stronger without your commitment to excellence and dedication to the education of inquisitive, bright minds. We appreciate you! Relax and enjoy your summer. You deserve it!

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Curriculum Issues

(from FITZGERALD, page 2)

Transfer of Learning

Certification candidates do not transfer their learning from gifted child education to other areas in which enrichment and differentiation can provide opportunities for students in need. A combination of factors lead to this common practice. First, learning in school for any person is different from life experiences. Content is packaged into courses that are typically taught in sequence. Broad topics with multiple levels of complexity are not incorporated into this sequence until "the background is covered." Students are expected to master the content sequentially, which is hardly parallel to problems encountered in life.

Second, teacher educators rarely focus on the interrelatedness and continuity of content between courses. This can be due to the aforementioned manner in which they were probably trained; or, more likely, to a lack of adequate time to explore perceptions and expectations they and their students bring to the educational setting.

Failure to address how differentiation, enrichment, and focusing on interest can be conducive to the learning of all students in the classroom prompts gifted child education programs to be deemed elitist by many (e.g., Oakes, 1985; Sapon-Shevin, 1994). Many teachers, however, tend to accept that gifted learners need different approaches, instructional plans, and enriched curricula...
to meet their ability levels. This assumption, of course, is true for any learner in the classroom setting.

Planning to Teach

All preservice teachers learn various models of teaching intent on meeting the needs of various learners' abilities. Once taught, these instructional guidelines are expected to be used in classroom contexts. The perception is that the in-service professional makes reflective decisions based on the classroom milieu to help all students learn.

This assumes that the teacher has expertise and comfort in manipulating models of teaching guidelines and procedures to meet the needs of him/herself and the students. This takes effort, and is not underwritten with guaranteed success. Therefore, it is more likely that teachers will focus on a prescribed and described model with inherent flaws but a clear expectation for student outcomes (based on research and anecdotal records provided by the author of the model) rather than trying to individualize instruction when working with students.

This is also apparent when examining teaching practices employed over a series of years. Teachers are more likely to implement strategies that have provided even minor successes in the past rather than work through a new system of teaching without any guarantees of enhanced student learning.

As anyone who has learned a new skill intuitively understands, practice is essential before the skill becomes an effective means of working in a situation. There is a "learning curve," during which time the novice will struggle with intricacies of an approach. If there is reasonable success with the approach, the novice develops some expertise and is more likely to further his/her learning (and its implementation in the classroom). If, however, there is struggle and uncertainty, the novice is more likely to cast off the strategy rather than continue the anxiety associated with an unproven option. Obviously, there is much more to instructional planning and implementation than a few certification courses, field experiences and practicum semester.

Being Opportunistic

Preservice teachers enter the education field with highly developed notions about their future classrooms, just as you did when your career began. Rarely are these perceptions and expectations challenged or reflected upon in general education courses (Price, 1998). Teacher preparation courses provide procedural knowledge including methods of teaching, classroom management, and recognition of instructional strategies. They do not focus on the most important classroom component, the students.

This lack of emphasis is exactly where gifted child education has the most to offer general education. Gifted child education focuses on the needs of individuals first, then on how to appropriately address these needs using pedagogy and curriculum. Those of us whose expertise is in gifted child education understand that students learn at different rates and have different abilities. We realize that school structures regularly need alteration to provide opportunities for student learning. We know that theories and practices used with gifted learners are good for all children, although our concern centers on the gifted and talented. Above all, we focus on students' individual strengths, a position frequently neglected by our general education colleagues who more often are concerned with correct procedures for writing lesson plans, developing test questions, and managing classrooms.

So, what is a teacher struggling to meet diverse learner needs in a fully included classroom to do? Seek out expertise in local districts (consultants, coordinators, parents, students) and encourage discussion on topics of giftedness in classrooms. Invite these individuals to experience the daily process of teaching by visiting your classroom. Try some strategies associated with your yearly, six-hours of continuing education (Level II and Level III training) and then correspond with your presenter or other experts in the field to gain more information. Use this knowledge, and your own experiences, to aid your curriculum decision-making. Invite other teachers to visit your classroom and provide constructive feedback on your teaching. Do the same with your students. Involve them in making choices to promote their learning. All of these opportunities allow you and your students to grow in both awareness and expertise regarding the nature and needs of the gifted and talented in a classroom setting.

Creativity and advocacy are two strengths educators of the gifted child cherish — use them. Share stories about giftedness with preservice and in-service teachers. Offer to present an introduction to giftedness (and its relevance for all teachers and students) in colleague's classrooms. Above all, encourage discussion, so others begin to understand that giftedness is someone you are, rather than some measured potential or developing ability.
Due to the cyclical nature of service learning, the current Texas PK-12 Learn and Serve America program is set up on a three-tier grant level beginning with minigrant funding of up to $2,000 for the initial project, continuing with an expansion grant (up to $4,000), and culminating with campus grants (up to $10,000). A dollar-for-dollar match in cash or a listing of in-kind services must be included with the grant application.

Examples of successful service learning projects within Texas include C.A.R.E.—Children Actively Re-establishing Ecosystems in the Bridge City ISD. Intermediate students, upset by the number of trees destroyed and animals displaced by the building of their new school, were encouraged by science department teachers to brainstorm ideas for a remedy. Working with the National Parks and Conservation Association, the Texas Forestry Service, their Region V Education Service Center and the high school industrial technology class, the students designed and created a park and walking trail that could be used by not only the students but also community members, including residents of the Green Acres Nursing Home.

In Georgetown ISD, the aquatic science class at Richarte High School found very high *E. coli* bacteria counts from sewage runoff while testing the water quality of the San Gabriel River. After presenting their research results to the school board and the city council, the city repaired sewage lines to improve water quality. The students went on to another step they called “River Cleanups,” writing a video script that was professionally produced for local civic groups; they also created a “hike and bike” trail along the San Gabriel, worked with the Georgetown Parks and Recreation Department to help them plan an outdoor education center, and assisted in developing science curriculum about the river for 4th through 6th grade students. These efforts were presented to an audience of 250 middle school and 90 elementary school students.

At Lake Waco Montessori Magnet School for Environmental Studies in Waco, a PK3-grade 6 campus that is part of Waco ISD, a Learn & Serve minigrant called Weather and Waste: The Three R’s Squared began by focusing on solid waste management through yard waste composting with the Landon Branch Neighborhood Association. This service component was combined with campus involvement in the Global Learning and Observations to Benefit the Environment (GLOBE) program, a worldwide project that teaches students the scientific protocols needed to record meaningful scientific data about water, soil, atmosphere and land that professional scientists can use in studying the global environment.

During the course of the 1998-99 school year, three
intermediate multi-age classes in grades 4-6 also become involved in two additional service components: 1) counting and researching birds at campus feeders as part of Classroom Feeder Watch, a national middle school program directed by the Cornell University Lab of Ornithology, and 2) monitoring the aquatic habitat of a seasonal wetland located on private property through a statewide pilot program, Project MarshMALLOW, coordinated by the Texas Agricultural Extension Service. This effort was linked to Texas Amphibian Watch, one of nine Texas Nature Trackers projects coordinated by the Wildlife Diversity Program of Texas Parks and Wildlife. Open to citizen-scientists of all ages across the state, Texas Amphibian Watch is a partner with the North American Declining Amphibian Task Force.

Final products by the intermediate students included a composting slide show at the quarterly meeting of the neighborhood association, a student Birdscope magazine, a booth describing the student projects at the Waco Earth Day celebration, and a wetlands puppet show and four-minute video produced with the help of Waco ISD TV personnel that formed the campus's Project MarshMALLOW presentation at May, 1999, culminating conference in Corpus Christi.

In each example above, gifted students who were part of the service learning project were challenged to think, create, and communicate as firsthand investigators, with hands-on inquiries resulting in student products and/or services directed toward a larger audience within the school district or community. Although environmental issues served as the focus of these authentic learning examples, projects with an interdisciplinary or integrated learning approach are equally appropriate.

In the fall of 1999, after evaluating its first Learn & Serve project, the Lake Waco Montessori Magnet campus applied for and was granted an expansion grant for the 1999-2000 school year. Called Going Global: Explorations Across Time, Space, and Environments, the project developed from a growing campus need for additional emphasis on geography and history, both of which are part of the Montessori cultural studies curriculum starting in kindergarten. Intermediate gifted students brainstormed a list of community organizations they could help by sharing their knowledge about the environment, resulting in a list of project activities ranging from e-mail penpals, a campus web site linked to the main Waco ISD web site, pressed flower bookmarks for members of a retirement residence, and continued research into weather, waste, birds, biomes, and amphibians.

When written and approved, the expansion grant proposal incorporated the continuation of intermediate student involvement in the GLOBE program, Classroom Feeder Watch, and Texas Amphibian Watch and added an in-depth component with the JASON XI Project: Going to Extremes, available through Region XII’s Education Service Center as part of teacher participation in its Collaborative for Excellence in Science Teaching. Starting as kindergartners, students researched the Earth’s continents, learning about their history, physical and political geography, and the biomes and cultures found on each. A student nickname, The Explorers, was chosen, with The Global Explorer selected as campus mascot.

Agreeing to serve as community partner was the Stilwell Retirement Residence for retired teachers, some of whom became involved in an oral history project by G/T sixth graders documenting the teachers’ memories of their childhoods, early school experiences, and the weather and extremes of their early 20th century environments. Thanks to coaching tips from Dr. Rebecca Sharpless of Baylor University’s Institute for Oral History, who helped prepare the student interviewers, these taped and transcribed interviews became the heart of a professionally printed 80 page book showcasing a wide variety of articles and artwork from students ranging in age from 5 to 12. Edited and formatted for printing by a graphic arts class at Baylor University under the direction of Professor Terry Roller, the printed version of Going Global successfully capped the campus’s journey around the world.

Anthropologist Jennifer James, keynote speaker during the First General Session of the 1998 TAGT conference, elaborated on teachers’ roles and the profound changes they should anticipate in their students and classrooms in the year 2000 and beyond. In Thinking in the Future Tense (1996), on which her address was based, James writes of students coming to the elementary classroom already possessing computer literacy skills, capable of challenging their teachers to be or become competent at new levels of information gathering, data retrieval, and problem solving.

James’s prediction is not a hypothesis; in classrooms across the country gifted learners increasingly demand more attention and discussion from their teachers on local and global issues while often assuming the role of
expert in areas related to technology. Like the title of the recent period movie featuring the collaboration of librettist William Gilbert and composer Arthur Sullivan, the successful classroom for advanced learners may now appear to be “topsy turvy” with teachers increasingly active “behind the scenes” in the roles of facilitator, coach, and resource coordinator, as they guide, advise, and assist their students.

Renzulli (1999) reminded his TAGT audience last December at the First General Session that: “The best way to predict the future is to create it.” As gifted and talented students explore new roles as citizen-scientists on their campuses and in their communities through action research and service learning, they are realizing their potential as leaders and creating the future that they personally consider relevant to the real world.

References
Service-Learning. www.txserve.org/servlrn.html

N.B. The website for the Texas Center for Service-Learning (www.txserve.org/servlrn.htm) provides general information on the benefits of service-learning as well as details on Texas Service-Learning Initiatives and Resources, including Texas Regional Service ESC contacts.

Dr. Mary Nied Phillips is the lead gifted and talented teacher as well as the environmental studies specialist at the Lake Waco Montessori Magnet School for Environmental Studies in Waco, TX. She acted as the campus coordinator for both of their recent Learn & Serve America projects and is also on the faculty of Baylor University’s summer program for gifted and talented students.

(from HUTTON, page 9)
There are three types of future options to consider. Probable future options are future environments that extrapolate current trends on a constant steady state basis derived from history. Plausible future options are future environments that can speculate about possible surprises or discontinuities resulting in unexpected results or wildcards. Preferable future options are future environments that use imagination to develop choices or visions of a desired future. To assure these future options are good ideas, all should be grounded in research based on trends, and must be plausible, meaning a believable story can be told about them. In addition, to achieve a desired future, the ideas should be creative and describe concepts no one has thought of before.

Using Future Studies Techniques for Future Problem Solving Workshops, using Studies of the Future tools and techniques, were conducted in Spring Independent School District (SID), Spring, Texas during the 1998-99 school year in preparation for the FPS competition. The workshops included middle school and high school teachers and students in the FPS program. The objective of the workshops was to increase students’ futuristic thinking and improve their ability to participate in the FPS competition. Both teachers and students received a short presentation on thinking futuristically and a number of specific future studies’ techniques related to FPS. The techniques included, mechanisms of change, trend analysis and forecasting, and lateral thinking. In addition, the workshop reviewed two matrix concept techniques describing problem significance and solution impact. Both of these concepts are important in the FPS process.

To measure the effect of these workshops on the students’ success in the FPS competition, the number of SISD student teams sent to the state FPS competition was compared to the previous year participation. During the 1997-98 school year, SISD sent three middle school teams and one high school team to the state FPS competition. In the 1998-99 school year, after the workshops, SISD sent seven middle school teams and three high school teams to the state FPS competition.

While there was a dramatic increase in the number of teams qualifying for the state competition after the workshops, the distinctiveness of the FPS scoring system may have also had some effect. However, the results indicate the workshops had some impact on the students’ abilities to compete in the FPS program based on
their improved ability to think about the future. After the workshops, some of the teachers and students described what affect the workshops had on them. The overall results of the survey indicate the following:

- The topic of thinking about the future is very interesting, stimulating, and challenging to both teachers and students.
- The first exposure to thinking futuristically overwhelmed many teachers, and this negatively impacted the use of the concepts in the classroom.
- After further exposure to the concepts, the teachers began to understand the value and application of the techniques.
- Until the teachers develop confidence in their ability to use the material in the classroom and see its value, the students will not benefit from the teacher workshops.
- The students learned the techniques rapidly even on first exposure. This may result from the students’ willingness to try new concepts without previous bias.

Overall both the students and teachers felt the concepts presented in the workshops provided a new way of thinking and better foundation for thinking about the future during the FPS competition.

References

Kent Hutton is Director of KM Concepts Fredericksburg, Texas and has a Master’s Degree in Studies of the Future for the University of Houston-Clear Lake. Work emphasis includes helping teachers and students utilize Future Studies techniques in Future Problem Solving (from BATSON, page 3)

...ent possesses a unique set of skills, interests, and abilities. As the student applies these personal traits in the classroom, another curriculum emerges – the curriculum that the student actually learns.

The curricular requirements for schools in a democratic society must be dynamic even as consistency and accountability are desired. In Texas, law requires state curriculum and assessment systems with the assessment portion receiving the most press coverage (see Fall 2000 Tempo for further discussion). The Texas Essential Knowledge and Skills (TEKS) that guide state mandated, general education now define curriculum in our state public schools. The TEKS provide preparation for the state mandated assessments including Texas Assessment of Academic Skills (TAAS) and more. The TEKS, if modified, provide some hope for aligned and challenging curriculum for Texas gifted students.

Modification and Differentiation
Modification is the key. To be successful, modification or differentiation must be based on a solid, well developed, and aligned general education curriculum. The TEKS, if implemented, can become this core.

Content, Process, Product
Through differentiation of the TEKS, gifted students can access learning opportunities that meet their individual and collective unique needs. Curriculum differentiation is a long-standing facet of appropriate services for gifted students. More than 30 years ago, the National/State Leadership Training Institute for the Gifted/Talented, under the leadership of Irving S. Sato, addressed differentiation of content, process, and product. Depth, complexity, and pacing also have been recognized as critical attributes of differentiated learning opportunities. To that end, the Texas State Plan for the Education of Gifted/Talented Students requires that curriculum and instruction meet the needs of gifted students by modifying the depth, complexity, and pacing of the general school program. Access to such curriculum and instruction is non-negotiable if gifted students are to achieve.

Classroom Design
The touchstone site for learning often is thought to be the classroom. For many gifted students, however, learning does not occur in the classroom. If the schoolroom is truly a place for student learning, it must be differentiated. C. Tomlinson (1999, 16) compares the traditional
and differentiated classroom, beginning with student differences; in the traditional setting, these differences “are masked or acted upon when problematic” but in the **differentiated classroom** they “are studied as a basis for planning.” Responsiveness to student needs, flexibility, multiplicity, teacher as “guide on the side” rather than “sage on the stage” permeate these classes. Access to differentiated classrooms is non-negotiable if gifted students in school are to learn.

**Assessment and Accountability**

Opportunities to demonstrate learning and to be assessed should mirror the curriculum. Texas school accountability reported via the Academic Excellence Indicator System (AEIS) assumes that a student’s success on its foundation assessment, the Texas Assessment of Academic Skills (TAAS), reflects a year’s growth for a year’s work. That assumption is based on the idea that most students are beginning at a common point and proceeding at a similar pace through the curriculum.

The AEIS does recognize that some pupils don’t bring the traditional skill set to the school environment and thus require modified curriculum, instruction, and testing. Students with disabilities may access assessments that match their differentiated curriculum. Students for whom English is their second language may take tests aligned with their modified program. Students identified as gifted/talented do not have state assessments that match their differentiated curriculum. Texas gifted students are denied opportunities to demonstrate their learning on the state accountability system. Access to assessments that reflect differentiated curriculum is a non-negotiable if Texas gifted students and their school systems are to be held accountable.

**Compact**

A compact is an agreement between two or more persons or groups. In schools, the curriculum serves as an agreement between the professional educators, parents, the community at large, and certainly the students. Such an agreement stands as the commitment regarding what will be taught, what students can expect to learn, what society can anticipate as these children and youth become adults. To have a compact that is owned by all parties, research, discussions, reviews, and contemplation on grand scales must occur. The state of Texas pursued all these avenues and more in the preparation of the TEKS. Thus the general education curriculum is planted in solid ground.

To have a compact of value for gifted students, an appropriately challenging curriculum is required. Content, processes, and products must be modified through complexity, depth, and pacing. This curriculum must be the bedrock of the differentiated classroom. Students in these classrooms across Texas deserve and have the right to demonstrate their learning and to be included in the state accountability system.

**Challenge and Commitment**

The current compact for Texas gifted students is a patchwork quilt with significant pieces missing. Some school districts have embraced the Texas state plan while others have not. Differentiated classrooms are scattered haphazardly across the state. Modified assessment options for purposes of accountability are not available. Consistency, quality, access, and accountability are lacking.

To become excellent, the curriculum compact with Texas gifted students must receive undivided time, attention, and commitment from each and every one of us—teachers, parents, principals, counselors, coordinators, directors, superintendents, school board members, business leaders, legislators, university faculty, and all friends of gifted. Are you ready to make this commitment?

**References**


What the Research Says About Curriculum

Susan K. Johnsen

According to the Texas State Plan for the Education of Gifted/Talented Students (TEA, 1996, p. 7), curriculum and instruction meets the needs of gifted students when its depth, complexity, and pacing are modified. These modifications may include opportunities for students to pursue areas of interest, develop advanced-level products or performances, and/or accelerate through content. Since a variety of choices are available, it is important for the teacher to know which curriculum materials and modifications have the greatest interest, develop advanced-level products or performances, instruction meets the needs of gifted students when its depth, complexity, and pacing are modified. These modifications may include opportunities for students to pursue areas of interest, develop advanced-level products or performances, and/or accelerate through content. Since a variety of choices are available, it is important for the teacher to know which curriculum materials and modifications have the greatest support in the research literature. Therefore, the focus of this review is to examine the effectiveness of various curriculums and/or instructional strategies.

Articles published in Gifted Child Quarterly, Journal for the Education of the Gifted, and Roeper Review during the past ten years were examined. To be included, the article needed to address curriculum such as structured units and courses of study or student-generated activities; and needed to include the effect(s) of the curriculum. Studies were excluded if they focused primarily on a program model such as ability grouping, if they were a summer curriculum, if their empirical support was simply student self-report, and if the program was outside the United States. Using this selection process, 28 articles were reviewed.

The authors examined the efficacy of these modifications: acceleration (8 articles), problem-based learning (5 articles), student-generated independent studies (4 articles), and the incorporation of thinking strategies (5 articles) such as synectics, creative problem solving, open-ended tasks, and questioning. Three of the articles examined the effects of specific curriculum units that were designed for gifted and talented students (see VanTassel-Baska's William and Mary units). The vast majority of the curriculum modifications addressed the core academic areas or related topics. The samples studied were split between elementary and secondary students.

Curriculum effectiveness was determined primarily by examining achievement gains on nationally norm-referenced tests, performance-based tests, AP exams, grades, and successful performance on subsequent courses. Some of these achievement-oriented tests were related to the objectives of the curriculum such as writing, grammar, and syntax in the language arts units (VanTassel-Baska, Johnson, Hughes, & Boyce, 1996), depth of understanding in problem-based learning (Dods, 1997), problem finding in problem-based learning (Gallagher, Stepien, & Rosenthal, 1992), and hypothetical problems in creative problem solving (Schack, 1993). Other tests were not aligned with the curriculum objectives but measured related social areas such as increased self-concept (Olencak, 1995), transfer of thinking skills to the family setting (Moon, 1995), and improved habits of the mind (VanTassel-Baska, Avery, Little, & Hughes, 2000).

Overall, acceleration studies consistently showed gains in achievement and successful performance on subsequent courses. While the one empirical study on curriculum compacting did not show differences in achievement between the experimental and control groups, the students' scores did not decline even when 40 to 50% of the content was replaced (Reis, Westberg, Kulikowich, & Purcell, 1998).

Students and teachers who used the William and Mary units in language arts and science described them as motivating and benefiting students by increasing engagement, reasoning, and habits of the mind. Experimental groups did improve on standardized tests and performance-based assessments that were developed to measure the goals of the Integrated Curriculum Model.

When student interest was used to direct the curriculum, the researchers found that underachievers became achievers (Baum, Renzulli, & Hebert, 1995; Rimm & Lovance, 1992), and that they were more interested in creative outlets (Hebert, 1993). Interestingly, when independent study was assigned, students did not enjoy completing projects (Moon, Feldhusen, & Dillon, 1994).

Problem-based learning influenced the retention of students' knowledge and the depth of their understanding (Dods, 1997), did not sacrifice content acquisition (Gallagher & Stepien, 1996), and improved students' abilities to find problems (Gallagher, Stepien, & Rosenthal, 1992). Other strategies showed improvements in other areas. For example, higher levels of teacher questions elicited higher levels of student questions, synectics improved performance on creativity tests, and future problem solving influenced students' attitudes toward future roles.

Given that curriculum and instruction are the heart of education for gifted and talented students, only a limited number of studies exist that examine the efficacy of these significant program components. In fact, Shore and Delcourt
(1996) found that out of 40 recommended curricular and program practices only five received strong empirical support. This failure to address the effectiveness of various materials means that teachers and school districts need to be cautious in selecting and using materials in their programs for gifted and talented students. Much research remains to be done.

**Baum, S. M., Renzulli, J. S., & Hébert, T. P. (1995). Reversing underachievement: Creative productivity as a systematic intervention. Gifted Child Quarterly, 39, 224-235.** In this study 12 teachers selected 17 students, ages 8-13. All students participated in a Type III study during the school year. Using a multiple case study design, they found that after the intervention, most of the students were no longer underachieving. They found that these factors contributed to the improvement: relating to the teacher, learning about self-regulation strategies and underachievement, working on an area of interest in their preferred learning style, and interacting with an appropriate peer group.

**Dods, R. F. (1997). An action research study of the effectiveness of problem-based learning in promoting the acquisition and retention of knowledge. Journal for the Education of the Gifted, 20, 423-437.** Richard Dods at the Illinois Mathematics and Science Academy compared the effects of problem-based learning (PBL), traditional lecture (L), and a combination (PBL + L) on student retention of the major concepts in an elective biochemistry course taught at a school for talented students. He collected data through student self-evaluation of the depth of understanding, a test instrument used to measure actual depth of understanding, and a student evaluation of the course. The author found that in-depth understanding is increased by the PBL experience whereas content coverage is promoted by lecture.

**Friedman, R. C., & Lee, S. W. (1996). Differentiating instruction for high-achieving/gifted children in regular classrooms: A field test of three gifted-education models. Journal for the Education of the Gifted, 19, 405-436.** This study examined three instructional models: the Enrichment Triad Model (Renzulli & Reis, 1986), the Multiple Talent Model (Taylor, 1986), and the Cognitive-Affective Interaction Model (Williams, 1986). These models were field-tested in inclusive, general-education classrooms in rural, low-income, and/or ethnically diverse communities. The researchers analyzed how certain elements of the model affected the cognitive complexity of the classroom environment and student involvement in school work. Using a multiple baseline across settings design, the researchers interviewed the participants and observed in teachers' classrooms. They found that a strong positive relationship existed between teacher questions and student responses—the higher cognitive level of the teacher question elicited higher cognitive levels of student responses. The students in classrooms using the Cognitive-Affective Interaction Model demonstrated the greatest gains in higher cognitive levels.

**Gallagher, S. A., & Stepien, W. (1996). Content acquisition in problem-based learning: Depth versus breadth in American studies. Journal for the Education of the Gifted, 19, 257-275.** One hundred sixty-seven high school students' scores on a multiple-choice standardized test were compared after traditional and experimental instruction. In the experimental curriculum students used data and varying perspectives to resolve problems related to a variety of dilemmas such as the Salem witch trials, the use of the nuclear bomb on Hiroshima, civil rights and so on. Results indicated that students in problem-based learning classes did not sacrifice content acquisition in American Studies when compared to students learning in more traditional settings.

**Gallagher, S. A., Stepien, W., & Rosenthal, H. (1992). The effects of problem-based learning on problem solving. Gifted Child Quarterly, 36, 195-200.** The 78 students who participated in the experimental group were enrolled in a high school residential school for students talented in mathematics and science. The students received a problem-based course that incorporated social science, physics, and mathematics: Science, Society and the Future. The experimental group became significantly better at problem finding and performed better than the comparison group on fact finding, problem finding, and solution finding. Interestingly, the researchers found that prior experience with problem solving did not appear to affect the results.

**Hébert, T. P. (1993). Reflections at graduation: The long-term impact of elementary school experiences in creative productivity. Roeper Review, 16, 22-28.** This research examined the question: What is the long-term impact of creative productivity experiences in elementary school? Using nine case studies of students who had participated in the Renzulli Enrichment Triad Model in grades four through six, the author conducted in-depth, open-ended, tape-recorded interviews in their homes during the spring of their high school senior year. Products and available management
plans provided additional information. The following themes emerged after analyzing the interviews, products, and plans: Type III interests affect post-secondary plans; a decrease in Type III activities in junior high occurs; earlier Type II activities provide training for later productivity; and non-intellectual characteristics such as creativity and task commitment remain constant.

Hertzog, N. B. (1998). Open-ended activities: Differentiation through learner responses. Gifted Child Quarterly, 42, 212-227. In this ethnographic study, the researcher focused on how and in what ways the responses to open-ended activities of children identified as gifted differed from responses of children who were not identified as gifted in one third-grade and one fourth-grade heterogeneously grouped classrooms. “Open-ended” activities refer specifically to those with multiple responses rather than one correct answer. Data sources included observations over the course of one academic year, interviews with teachers and students, learning style and interest assessment instruments, and documents related to over 33 open-ended activities. The author found that the two teachers in the study evaluated students’ responses relative to their expectations of the students, in relationship to the students’ abilities. Frequently, students pursued the same knowledge in different ways, but when choices were provided within the content domain, greatest differences in responses occurred. The author found that differentiation of learner responses occurred even when the product involved limited student choices and was not “open.”

Johnson, D. T., Boyce, L. N., Van Tassel-Baska, J. (1995). Science curriculum review: Evaluating materials for high-ability learners. Gifted Child Quarterly, 39, 36-43. This article describes the findings of a review of existing K-8 science curriculum materials. Twenty-seven sets of materials were reviewed using criteria based on the new standards in the teaching of science and the needs of gifted learners. This review suggests that many existing basal textbooks fail to meet new science curriculum standards for high-ability learners particularly in the areas of discernible program goals and summative research on their effectiveness.

Kolitch, E. R., & Brody, L. E. (1992). Mathematics acceleration of highly talented students: An evaluation. Gifted Child Quarterly, 36, 78-86. Approximately 750 students who had participated in the Study of Mathematically Precocious Youth responded to a questionnaire regarding the effects of the program. These students did well in mathematics courses taken several years earlier than is typical and excelled on AP calculus examinations. The majority of the students took calculus two and a half years earlier. The students also participated in mathematics competitions and summer programs, reported working with mentors, became involved in independent projects, and read mathematics books on their own. In general, the females appeared to be less likely to accelerate greatly.

Lynch, S. J. (1992). Fast-paced high school science for the academically talented: A six-year perspective. Gifted Child Quarterly, 36, 147-154. This article reports the results of a six-year study of academically talented students, 12 to 16 years old, who completed a one-year course in high school biology, chemistry, or physics in three weeks at a residential summer program. Students demonstrated subject mastery by taking college Entrance Examination Board science achievement tests. Their mean scores were higher than those of high school juniors and seniors. Follow-up studies indicated that students also performed well in subsequent science courses.

Meador, K. S. (1994). The effect of synectics training on gifted and nongifted kindergarten students. Journal for the Education of the Gifted, 18, 55-73. Pre and post tests of The Figural Form of the Torrance Tests of Creativity, the Martinek Zaichkowsky Self-Concept Scale and the Peabody Picture Vocabulary Tests were administered to 107 kindergarten students to determine the effects of synectics training. Curriculum materials included the Strange and Familiar and Art Synectics. The author found significant improvements in creativity scores for the experimental groups as compared to the control groups.

Miller, R., Mills, C., & Tangherlini, A. (1995). The Appalachia model mathematics program for gifted students. Roeper Review, 18, 138-141. In this study, 456 students in the second through the sixth grade participated in the model Mathematics program. The students were placed in four instructional groups on the basis of their quantitative scores on The School and College Ability Test. Each student in the MMP received an individual education plan and assessments were administered to determine mathematics placement within the curriculum. In three months, students in Group 4 (the fastest-paced) mastered 1.3 years of content; students in Group 3 mastered 1.0 years; and students in Group 2 mastered .4 years. The majority of Groups 3 and 4
were ready for algebra by seventh grade. A number of the students completed the high school mathematics course offerings as early as ninth grade. More students also participated in the Johns Hopkins University Talent Search and increased their performance on the SAT math.

Mills, C. J., & Ablard, K. E. (1993). Credit and placement for academically talented students following special summer courses in math and science. *Journal for the Education of the Gifted, 17*, 4-25. The researchers surveyed 892 academically talented students about academic credit and/or course placement for their participation in a precalculus or fast-paced science course during the summer. They found that 39% of the math students received credit and 38% of the science students received credit in their schools.

Mills, C. J., Ablard, K. E., & Lynch, S. J. (1992). Academically talented students' preparation for advanced-level coursework after individually-paced precalculus class. *Journal for the Education of the Gifted, 16*, 3-17. These researchers found that intensive summer precalculus mathematics courses that allowed students to proceed at an individual pace provided greater challenge and the prerequisites necessary to succeed in subsequent mathematics courses. About 80% of the students reported having received a grade of A in their high school mathematics course despite the fact that many were one or more years younger than their classmates. The authors conclude that schools should not be concerned that fast-paced courses do not adequately prepare gifted students for more advanced courses.

Moon, S. M. (1995). The effects of an enrichment program on the families of participants: A multiple-case study. *Gifted Child Quarterly, 39*, 198-207. This study examined the effects of the Purdue Three-Stage Model that included two hours of intensive instruction per week in thinking skills, creative problem solving, and independent learning. Ten families of 12th grade students who had participated in the program for at least three years in the elementary school were included. They responded to surveys and were interviewed by the researcher. The researcher found that the enrichment model had these effects on the family. The students shared their experiences in the program, taught families creative thinking and problem-solving skills, and discussed their independent study projects. These interactions resulted in more parent-child communication, greater family cohesion, and enhanced family-school relationships. The effects of the program were not uniform across all families and were influenced by mediating variables.

Moon, S. M., Feldhusen, J. F., & Dillon, D. R. (1994). Long-term effects of an enrichment program based on the Purdue Three-Stage Model. *Gifted Child Quarterly, 38*, 38-48. The long-term effects on a group of 23 students and their parents of the Purdue Three-Stage Model was examined. These students participated in the elementary program for at least 3 years and were either seniors in high school or were attending college. Along with school data, participants and parents responded to a questionnaire. The enrichment program appeared to have had a positive impact on the students and was successful in achieving program goals. Negative effects included being pulled out of the regular classroom, increasing boredom with the regular program, and being different. Contrary to research, students did not appear to enjoy assigned independent projects, the authors conclude that student-generated studies around their interests may be more effective.

Olenchak, F. R. (1995). Effects of enrichment on gifted/learning-disabled students. *Journal for the Education of the Gifted, 18*, 385-399. This study examined the effects of a one-year participation in an enrichment program on the attitudes, self-concepts, and creative productivity of 108 gifted/LD youngsters enrolled in the fourth through sixth grades in nine school districts. Each of the students had an IEP that included the development of strengths as well as remedial goals and objectives. Curriculum compacting, assessment, and Types I, II, and III Enrichment were treatment interventions. The students were pre and post tested using the Arlin-Hills Survey Toward School Learning Processes and the Piers-Harris Children's Self-Concept Scale. In addition, tallies of initiated and completed Type III products were tallied. Gains were noted in self-concept and attitude. Twenty-seven of the 108 initiated Type III projects and 21 were completed—similar to gifted non-learning-disabled students. The author concludes that this type of program does make a difference for GT/LD students.

tests, and certifying performance in the course. 92% of those who took Calculus AB, the first two quarters of college calculus, 100% of those who took Calculus BC, the entire year of college calculus, and 88% of those who took Physics C received scores of 4 or 5 on Advanced Placement tests. The computer courses were designed at the Education Program for Gifted Youth (EPGY) at Stanford University. The authors concluded that computer-based education makes it possible for gifted and talented middle and early high school students to complete advanced courses in mathematics and physics earlier than expected.

Reis, S. M., Westberg, K. L., Kulikowich, J. M., & Purcell, J. H. (1998). Curriculum compacting and achievement test scores: What does the research say? Gifted Child Quarterly, 42, 123-129. Using a sample of 436 second through sixth grade classroom teachers in 27 school districts, these researchers selected 336 students who had complete sets of pre and post test scores on the Iowa Tests of Basic Skills. After receiving training in curriculum compacting, the teachers selected students who had received the treatment. While no significant differences were found in student performance on the ITBS between experimental and control groups, the authors did note that the scores did not decline even when 40 to 50% of the content was replaced with material not within the same content area.

Rimm, S. B., & Lovance, K. J. (1992). The use of subject and grade skipping for the prevention and reversal of underachievement. Gifted Child Quarterly, 36, 100-105. The parents of 14 underachieving children and their children who had been subject or grade skipped were interviewed to determine the effects of acceleration. In addition, administrators and teachers were also interviewed. The authors found that all of the children made good academic adjustments and that all of the parents would make the same decision again. While the majority of administrators and teachers were initially negative about acceleration, they changed their position as the child adjusted.

Schack, G. D. (1993). Effects of a creative problem-solving curriculum on students of varying ability levels. Gifted Child Quarterly, 37, 32-38. The subjects in this study were 276 students in grades six through eight. Treatment group students participated in a 45-lesson curriculum implemented over a 9 to 18 week period that involved instruction in the creative problem solving process. The students also used CPS to solve real school problems. Pre and post tests incorporated hypothetical problems that were used to assess problem solving. Treatment students showed significant gains in problem-solving ability as compared to students who did not participate in the treatment. No differences were found among ability levels.

Shore, B. M., & Delcourt, M. A. B. (1996). Effective curricular and program practices in gifted education and the interface with general education. Journal for the Education of the Gifted, 20, 138-154. The authors selected 40 generally recommended practices that fell under the heading of program practices from their 1991 book Recommended Practices in Gifted Education: A Critical Analysis. Five practices, which were uniquely appropriate to gifted education, received strong empirical support: acceleration, career education—especially for girls, ability grouping, program arrangements, and high-level curricular materials. Twelve other practices that received strong support were viewed as effective with gifted students and other students.

Sowell, E. J. (1993). Programs for mathematically gifted students: A review of empirical research. Gifted Child Quarterly, 37, 124-132. This article summarizes and critiques the empirical research on programs for mathematically gifted students. The research indicates that accelerating the mathematics curriculum is desirable for the precocious student who reasons well. Precocious students enjoy working with others who are precocious and find the fast pace “invigorating.” Since definitions of mathematical enrichment are unclear, the author found it impossible to draw conclusions about its efficacy.

Tallent-Runnels, M. K., & Yarbrough, D. W. (1992). Effects of the future problem solving program on children’s concerns about the future. Gifted Child Quarterly, 36, 190-194. The purpose of this study was to determine if gifted students participating in the Future Problem Solving Program would feel that they had more control over their future and different concerns than other groups of non-participating gifted or average-ability students. The sample was 139 students in grades 4-6 from a school district in the Southwest. Results indicated that gifted students who participated in FPS programs responded in a more positive manner about their roles in the future. They also mentioned world affairs, space, technology, war, school or education more frequently than the other groups. The authors conclude that if those who participate in FPS feel that they have more control over their future that non-gifted students might also benefit.
Swiatek, M.A. (1993). A decade of longitudinal research on academic acceleration through the study of mathematically precocious youth. Roeper Review, 15, 120-123. Five cohorts who participated in the Johns Hopkins University Study of Mathematically Precocious Youth were surveyed at the age of 19, some at the age of 23, and some at the age of 33. Students who choose to accelerate in high school do not suffer academically but gain speed in their educational preparation. These students perform well at advanced levels of study, complete college, and attend graduate school in numbers that exceed the national average. In addition, the students also express satisfaction with college and their experiences.

VanTassel-Baska, J., Avery, L. D., Little, C., & Hughes, C. (2000). An evaluation of the implementation of curriculum innovation: The impact of the William and Mary units on schools. Journal for the Education of the Gifted, 23, 244-272. An evaluation team used case studies at two school sites to examine the three-year implementation of the William and Mary language arts and science curriculum units at the elementary levels. They collected interviews, conducted focus groups, examined documents, and made classroom observations to determine the effects and impact on the school system. Students, teachers, parents, and administrators described the units as benefiting learners—increasing student engagement, enhancing reasoning skills, and improving habits of mind. Teachers also noticed that they acted more as facilitators when teaching the units. The components that appeared to contribute to greater student involvement and interest included hands-on, action oriented, and real-world problem activities. The implementation of the units affected regular teachers' curriculum in one district, but not the other. The latter district did not have a strong interface between the gifted and general education programs. Neither district tended to use the student assessment component to monitor achievement so these data did not contribute to program improvement and decision making.

VanTassel-Baska, J., Bass, G., Ries, R., Poland, D., & Avery, L. D. (1998). A national study of science curriculum effectiveness with high ability students. Gifted Child Quarterly, 42, 200-211. The sample included 1,471 students in 62 classes who were in 15 school districts, and 42 teachers who had been trained in using the selected unit, Acid, Acid Everywhere. The Diet Cola Test was used as a pre-post measure to determine student gains in science process skills. The experimental groups did perform better on the Diet Cola Test. In addition, teachers gave the highest ratings to these items on a questionnaire: goals and outcomes were appropriate, students were actively involved, hands-on activities were motivating, unit topics were interesting and relevant, and activities were appropriate to student abilities.

VanTassel-Baska, J., Johnson, D. T., Hughes, C. E., & Boyce, L. N. (1996). A study of language arts curriculum effectiveness with gifted learners. Journal for the Education of the Gifted, 19, 461-480. This study examined the effects of a 40-hour language arts curriculum unit on elementary students in grades four through six in selected school districts. The Integrated Curriculum Model incorporated these goals: “to develop literary analysis and interpretation skills, to develop persuasive writing skills, and to develop linguistic competency” (p. 464). The experimental groups improved significantly in all three dimensions of the performance-based assessments: writing, grammar, and syntactic forms and functions. The authors conclude that more targeted curriculum intervention that is aligned with specific assessments needs to occur in classrooms for gifted students. They also reported that the abstract concepts and ideas in the unit may be difficult for average learners at this grade level.

Susan Johnsen is Associate Dean of Scholarship and Professional Development at Baylor University. Editor of Gifted Child Today, she was the principal investigator of Project Mustard Seed. She is author of four tests that are used in identifying gifted students: Test of Nonverbal Intelligence (TONI-2), Screening Assessment for Gifted Students (SAGES), Screening Assessment for Gifted Students—Primary Version (SAGES-P), and Test of Mathematical Abilities for Gifted Students. She is a past President of the Texas Association for the Gifted and Talented.
**Question:** Our district has served identified gifted and talented students for years in mathematics and the reading/language arts area. Now we are told that they must be served in other areas. What are those other areas?

**Answer:** Section 3.1A of *The Texas State Plan for the Education of the Gifted/Talented Students* states “School districts shall provide an array of appropriately challenging learning experiences for gifted/talented students in grades 1 through 12 that emphasize content from the four core academic areas.” The four core academic areas being referred to are reading/language arts, mathematics, science, and social studies.

**Question:** If my son is in our district’s gifted program, does he need to be subjected to the on-level curriculum?

**Answer:** According to the state guidelines, curriculum and instruction for gifted students must be addressed by “modifying the depth, complexity, and pacing of the general school program.” Curriculum and instruction for gifted and talented learners built around what they should know at their grade level allows for more thorough coverage within a content area and the TEKS.

**Question:** I teach third grade. My district has a GT curriculum document for third grade that was written ten years ago. There is not one thing in this document that talks about depth, complexity, or pacing. Should I stop using that document and just use the on-level curriculum or should I continue to use this old GT curriculum? What should I do?

**Answer:** First, determine if your district is in the process of revising the GT curriculum. Whether they are or not, they might have suggestions for how you are expected to proceed. If the decision is up to you, remember three things: preassess, diagnose, prescribe, in that order. Preassessment in curriculum and instruction is vital to the diagnosing and prescribing that an instructor must do. Finding out what a student knows before instruction allows for efficiency and effectiveness in teaching. Preassessment allows the teacher to know whether he or she needs to stay on level or modify. Do not be surprised if gifted students need an occasional on-level lesson at any grade level. On one hand, skipping on-level lessons without preassessing, assuming that gifted learners “already know” is dangerous and can leave gaps in their knowledge base and increase the necessity for on-level lessons in the later grades. On the other hand, continuing on-level lessons without preassessing, assuming that gifted learners need this anyway is just as dangerous, leading to a waste of time which sometimes leads to bad attitudes toward learning. Diagnose the needs from your preassessment of the student and their past performance. Prescribe a curriculum that will meet their needs and allow students who wish to go further into a topic to explore. Be flexible enough to allow time for students to explore any connections/relationships that they make between the disciplines. By doing this you are creating conditions for depth and complexity to occur. Perhaps you will find that you are using a combination of resources that include your on-level curriculum, older GT curriculum, as well as other curricula that you had not even thought of using before.

**Question:** What is meant by modifying the curriculum using depth, complexity, and pacing?

**Answer:** Modifying a curriculum by depth simply means that the student is afforded opportunities to explore within a course of study at a greater degree than is typical. This allows for recognition of patterns, trends, principles, etc. that are not as easily discernible in a limited study. Modifying a curriculum by complexity means that the student is afforded opportunities for intense scrutiny of material across disciplines so that he or she can explore relationships in varied dimensions. Modifying the curriculum by pacing may be simply speeding up of the learning process by compacting the curriculum or may be slowing down to give time for in-depth study of a particular topic of interest.

**Question:** I teach both identified gifted and not identified gifted students in all three sections of Advanced Placement Chemistry. What can I do to differentiate for the identified gifted students?
**Curriculum Issues**

**Answer:** Just keeping with the state law concerning curriculum and instruction for gifted learners will help in meeting their needs in any homogeneous or heterogeneous setting. Make sure that you provide opportunities for the students to accelerate when needed. Use preassessment and modify your AP curriculum by quickening the pace—moving quickly through what the students can learn easily, and skipping what they already know. Planning for the students to use depth and complexity will assist in another point in the law—providing students with a continuum of experiences that lead to advanced level products. Plan for grouping within your classroom that will allow them to work with other identified gifted learners and not identified gifted learners. Provide opportunities for students to work independently. Dr. Carol Tomlinson’s “Independent Study: A Flexible Tool for Encouraging Academic and Personal Growth,” in the September 1993 Middle School Journal is an excellent resource for setting up independent study in any classroom. Help students to connect with out-of-school opportunities that will enhance their strengths.

**Question:** Is there a model GT curriculum out there that I should be using with my GT students?

**Answer:** Curriculum should serve as a map that helps you help your students to reach a destination. Just like any other destination, there are many ways of getting there. Your district should provide you with your destination. In other words, they will help you to focus on exactly where the students are headed. One statement from the state plan is particularly useful in this context— that the students be producers of advanced level products. The state has given you other guidelines about the tools you need to use along the way—depth, complexity, pacing, an array of learning opportunities, acceleration, independent study, etc. The curriculum, or route, that you choose will depend on that destination.

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**Texas Association for the Gifted and Talented**

**Mission Statement**

To promote awareness of the unique social, emotional, and intellectual needs of gifted and talented students and to impact the development of appropriate services to meet these needs.

**TAGT Executive Board Long Range Goals**

- Advocate appropriate services and accountability standards for all gifted and talented students.
- Provide current information and research about gifted and talented learners and the field of gifted education to the TAGT membership and general public.
- Develop an effective advocacy network.
- Increase and diversify membership.
- Develop strategic alliances with the Texas Education Agency, Education Service Centers, higher education, and others.
- Support quality professional development for educators of gifted and talented students.

Adopted by the TAGT Executive Board: 2.5.00
BOOK REVIEWS

The Independent Study Program, developed by Susan K. Johnsen and Kay Johnson, is a guide for helping students acquire and/or refine their research and organizational skills. The program has three components—a 145 page Teacher’s Guide; a 28 page, consumable Student Booklet; and 97 Resource Cards. The Teacher’s Guide offers detailed lesson plans for teachers on skills such as selecting a topic, organizing information, asking questions, and collecting information. It also provides lessons on developing a product, presenting a product, and evaluating the process as well as masters for overhead transparencies and classroom management forms.

The Student Booklet consists of worksheets and rubrics that help students plan and work their way through a project. The Resource Cards parallel the Student Booklet, providing additional examples, graphic organizers, and rubrics.

The authors of the Independent Study Program have taken a practical approach to every teacher’s task of helping students systematically organize their approach to projects. The program provides step-by-step models, flowcharts, and other methods that students (and their teachers) can use to refine techniques for planning, creating, and presenting projects. Based on the terminology and examples the program is best suited for students in grades four through eight, although some high school students and teachers might benefit from guidelines and rubrics. Unfortunately, the title is limiting. Independent Study Program is a valuable resource for any teacher who assigns a research project— not just “independent study.”

—reviewed by Mike Tracy

My Nature Journal is a creative and mind-provoking journal that allow naturalists of all ages to pause and take notice of the simple pleasure of various habitats. The descriptions are easy to understand and spark an interest to learn more. Teachers could use this book to enhance the students’ learning in small field studies, as an interdisciplinary unit on its own, or in conjunction with teacher mentoring in habitat areas in the community. Habitats not in the local area might be completed on family vacations.

My Nature Journal will enhance the curriculum of the Green Classroom or any unit on environmental science. It is strongly recommended for any interdisciplinary unit that involves the study of biomes, star gazing, environment, animals, or nature. It is most appropriate for grades 2-6.

—reviewed by Janice Johnson

From the time she started kindergarten until she entered Dartmouth College at age 14, Laura Bridges’ parents had to struggle not only to understand and keep up with their precocious daughter, but also to convince, pressure, and at times force schools to provide appropriate educational opportunities. In the beginning they had no idea that their daughter was gifted, or even what that meant, but only that her needs were not being met in school. They had to learn how to work with schools, districts, the state department of education, state attorney general, the courts, colleges, and universities.

This book includes a lengthy (132 pages) interview between Laura’s father, James Bridges, and her geometry teacher, Margaret Duvall in which Bridges details Laura’s school career and the difficulties they faced. Following this are three informative essays, including “Gifted and Talented Education: A Parental Primer,” “Gifted and Talented Education on the Planet Earth,” and “Fact and Value: Market Research in Education.”

The format of the book provides an immediacy not always found in educational writing. While primarily useful to parents, this book will be beneficial to anyone interested in the problems of educating the highly gifted.
Night Thoughts from the Pond  
Michael Cannon

I think it was the scream that woke me. It was 2:00 AM and the sound was still echoing through the night. It didn't sound human, but unless a dog was violently ill, or one of the neighbors had started butchering hogs, I couldn't think what it might be. Then I heard it again. A deep sound, primordial and compelling, like some beast in distress or a saw tearing through thick lumber. When the sound came again, I knew. The bullfrogs in the back yard pond were at it again.

When I built the pond and stocked it with fish and tadpoles a couple of years ago (trying to bring some woodland to the city), I had no idea of the vocal power of the little critters. I wonder what the neighbors must think, here in the desert, where a bullfrog is as common as a blizzard in August. Something seems to make these otherwise stoic animals need to announce their existence. The lizards that live in the rock wall have apparently have no need to shriek their presence, and neither have the fish who share the pond with the frogs.

As I lay awake, it struck me that the frog's amphibious existence, at home in both water and dry land, has implications for teaching, in particular for curriculum for gifted students.

Gifted programs and curricula often fall into one of two camps, depending on the district philosophy (or lack of philosophy), economic factors, and grade level of students.

On one side (the dry land, if you will), are the academic, content-based programs, the Advanced Placement and Pre-Advanced Placement classes with a rigorous, usually accelerated course of study. Students move beyond their age peers, both in content and speed. Everything is as expected and out in the open. Objectives are obvious, orderly, and well-structured.

At the other end of the spectrum is the creative, open-ended, project based curriculum (the green water world) in which the process is more important than the product, the discovery and inquiry experiences are the core of the learning process. The learning that goes on in these classrooms is at times no more clear to outsiders (parents, administrators, board members) than the rich green bottom of a pond.

Most gifted programs today try to have a happy mix of the two, an amphibious environment that emphasizes clear content without denying opportunities to swim in the waters of discovery. If you find your own curriculum getting too dry, take a plunge and let things float. Give more choices, allow exploration.

On the other hand, you may discover that your program is really waterlogged. Climb out of the pond, dry out in the sun for a while, and get your bearings again.

Sometimes, like the frogs in the pond, we may get a bit loud, advertising our presence to the land dwellers and the fish. How else can the other frogs tell where we are? Maybe the some things need waking up.

Myself, I'm looking for a nice, quiet salamander.
Call for Articles

Winter 2001
Guidance and Counseling of Gifted Children

The particular social and emotional needs of gifted and talented children are often overlooked by counselors, administrators, teachers and parents. Articles are requested that address these needs, describe successful counseling programs, vocational guidance, use of personality inventories (could include birth order and Myers-Briggs), and other related issues.

The deadline for submission of articles is September 1, 2000.

Spring 2001
Where Are They? Other Possibilities for Gifted Learners

After elementary school, gifted programming often changes dramatically, in content and structure. What type of programs exist for gifted students in middle and high school and at the university level? Where are the gifted adults? Articles may address the topic in different ways, including descriptions of programs, speculation on models, or portrayals of student experiences.

The deadline for submission of articles is December 1, 2000.

Guidelines for Article Submissions

Tempo welcomes manuscripts from educators, parents, and other advocates of gifted education. Tempo is a juried publication and manuscripts are evaluated by members of the editorial board.

Please keep the following in mind when submitting manuscripts:

1. Manuscripts should be between 1000 and 2500 words on an upcoming topic (see topics above).
2. Use APA style for references and documentation.
3. Submit three copies of your typed, double-spaced manuscript. Use a 1 1/2 inch margin on all sides.
4. Include a 100—150 word abstract of the article.
5. Include a cover sheet with your name, address, telephone and FAX number and/or e-mail address.

Send all submissions or requests for more information to:
Michael Cannon, TAGT Editorial Office, 5521 Martin Lane, El Paso, TX 79903

Texas Association for the Gifted and Talented Membership Application

Member Name(s) ___________________________ Telephone(H) ___________________________ (W) ___________________________
Mailing Address ___________________________________________ City ___________________________ State __________ Zip __________
School District & Campus Name/Business Affiliation ___________________________ ESC Region __________
Email address: ___________________________________________

PLEASE CHECK ONE:  ☐ Teacher  ☐ Administrator  ☐ Parent  ☐ School Board Member  ☐ Other ___________________________

Individual........$35 ( )  Family.......................$35 ( )  Student........$15 ( ) Must include verification (campus, district, grade)

Patron............$100 ( )  Institutional...........$100 ( )  Lifetime.............$400 ( )  Parent Affiliate....$45 ( )

In addition to your regular Membership, you are invited to join a TAGT Division for an additional fee.

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Return form and dues to: TAGT, Dept. R. B. #0471, P. O. Box 140187, Austin, TX 78789-0471.
# Texas Association for the Gifted and Talented

## 2000 Executive Board

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